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oxidizable substances in the stimulated plant parts? By a series of careful experiments Czapek demonstrated that there was no decrease in the *amount* of oxidases present, but that they were inhibited by some influence, this influence later proving to be an anti-enzyme. He showed that the anti-enzyme thus formed really neutralized the oxidizing enzyme in definite proportion; that it was specific for that one plant, less so for the genus and not at all for distantly related plants; that heating a mixture of anti-enzyme and enzyme to 62° destroyed the former, the latter then regaining its original activity. Czapek demonstrated also that the anti-enzyme does not exist at all in unstimulated parts of the same plants, but later is produced in them upon stimulation. This anti-enzyme has the power of inhibiting the normal oxidation of the homogentisic acid in the plant, so that after stimulation, both the homogentisic acid and the anti-enzyme make their appearance and accumulate. However, Graefe and Linsbauer<sup>54</sup> report that they were unable to find the increase of reducing substances in stimulated parts as claimed by Czapek.

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(To be continued)

## CHONDROPHORA VIRGATA IN WEST FLORIDA

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Ninety-three years ago that sagacious botanist, Thomas Nuttall, proposed as a new species *Chrysocoma virgata*,\* describing it at some length, and remarking that it was allied to *C. nudata* Mx., but might easily be confounded with *Solidago tenuifolia*. The locality given for it was "On the borders of swamps in New Jersey, near the sea-coast." In 1836 A. P. DeCandolle included this species and a few others in his new genus *Bigelowia*,† and cited a specimen collected "in Florida prope Savannah."

<sup>54</sup>Graefe and Linsbauer. Zur Kenntniss der Stoffwechseländerungen bei geotropischer Reizung. Sitzber. Wien. Akad. I. Abt. 118: 907. 1909.

\* Gen. 2: 137. 1818.

† Prodr. 5: 329. 1836.

About the same time specimens corresponding very well with Nuttall's description were collected in Louisiana by Hale and in Texas by Riddell and by Drummond, and these were doubtless taken into consideration by Torrey & Gray in describing the range of their "*Bigelovia nudata*,"\* for they did not regard the plant in question as specifically distinct.

No such plant has since been found within sixty miles of Savannah (Georgia), or within several hundred miles of New Jersey. The Louisiana and Texas specimens are still preserved in the Torrey Herbarium, but unfortunately, as in the case of many others collected in the first half of the nineteenth century, they are accompanied by no information about where they came from other than the name of the state. The omission of all data about habitat is especially disappointing, since in this particular species its habitat is one of its most important characters, as will be shown presently.

At various times in the second half of the 19th century our plant was mentioned in floras of the northeastern and southeastern states, usually as a variety of *C. nudata*, and in the absence of any accurate information to the contrary, it was assumed to have about the same range and habitat as its better-known relative, namely, the pine-barrens of the coastal plain. In 1894 Dr. Britton substituted Rafinesque's name *Chondrophora* for DeCandolle's *Bigelovia* (which was a homonym), and the following year Prof. Greene† restored our plant to specific rank, at the same time restricting the genus *Chondrophora* to these two species, *nudata* and *virgata*.

Twenty years ago, although the fact was probably not realized at the time, *Chondrophora virgata* was as completely lost to science as *Franklinia*, *Elliottia*, *Chrysopsis pinifolia*, *Pentstemon dissectus* and *Mesadenia diversifolia*, for no botanist then living had ever seen it growing. But on Sept. 15, 1892, Dr. Charles Mohr found on the rocky banks of Little River on Lookout Mountain in DeKalb County, Alabama, about 1,600 feet above sea-level, specimens of a plant which he identified with some hesitation

\*Fl. N. A. 2: 232. 1842. See also Gray, Syn. Fl. N. A. 12: 141. 1884.

†Erythea 3: 91. 1895.

as this long-lost species of Nuttall's,\* and a few years later Mr. Henry Eggert collected immature specimens of the same thing in the same general region.† In the spring of 1901 Mr. T. G. Harbison found it "in shallow soil in the glades and along rocky streams" on Sand Mountain in Marshall County, Alabama;‡ and in the winter of 1905-6 I saw it in Marshall, DeKalb and Cherokee Counties,§ always on Carboniferous sandstone along streams on the plateaus, as my predecessors had found it.

Up to 1903 the only known stations for this plant (excluding those in New Jersey, Louisiana and Texas as unknown) were in the mountains of Alabama. In that year, however, I collected it on outcrops of Altamaha Grit in Tattnall and Dooly Counties in the coastal plain of Georgia,|| and in 1906 I saw it in similar situations in Washington and Coffee Counties, in the same region.¶ At each of these places some of its associates were the same as in the mountains of Alabama, although the general aspect of the surrounding country was very different.

The only known exposure of Altamaha Grit in Florida is at Rock Hill, which is about  $4\frac{1}{2}$  miles southeast of Chipley; and up to last fall this interesting spot does not seem to have ever been visited by a botanist.\*\* Having heard something of this place through geological literature, I visited it on Sept. 24, 1910, to see how it compared with similar places in Georgia.

\*See Bull. Torrey Club 24: 28. 1897; Contr. U. S. Nat. Herb. 6: 79, 771. 1901.

†I saw one of Eggert's specimens in the herbarium of the New York Botanical Garden several years ago, but it has since been misplaced or destroyed, and I do not remember the exact data on the label.

‡Biltmore Bot. Stud. 1: 153. 1902.

§Torreya 6: 112, 114, 115. 1906.

||See Bull. Torrey Club 32: 168. 1905; Ann. N. Y. Acad. Sci. 17: 42, 43, 146. 1906. These two localities have since been included in the new counties of Toombs and Crisp, respectively. In 1900 (Bull. Torrey Club 27: 423) I inadvertently designated this species as an inhabitant of moist pine-barrens in Sumter County, Georgia; but my specimens proved to be nothing but the common *C. nudata*.

¶See Torreya 6: 243, 244. 1906.

\*\*In the Plant World for April, 1902 (5: 71), Mr. A. H. Curtiss reports having collected *Cheilanthes Alabamensis* "on top of a tower like rock" at Cedar Grove, a few miles south of Chipley. There happens to be a tower-like rock on one side of Rock Hill, but there are no ferns on it, and Mr. Curtiss's rock must have been of a very different sort, probably limestone

Rock Hill is one of a group of several peculiar isolated hills in the northern part of Washington County, Florida.\* I would estimate its dimensions roughly as about one-fourth mile long (approximately north and south), one-eighth mile wide, and 50 feet high. Like the country for several miles in all directions, it is covered with open forests of long-leaf pine, now badly damaged by lumbermen, so that the rocks on it can be seen from a considerable distance. On its slopes there are several horizontal ledges of a pine-bark-colored rock which seems to differ from the typical Altamaha Grit of Georgia† only in being a little more sandy, and this difference is apparent only on close inspection. Like the corresponding rock in Georgia, too, it never appears on the summit of a hill, but always on slopes. (See illustration.)

It seems to be generally true that the flora of any particular habitat is richest near the center of distribution of that habitat.‡ This principle is illustrated by the vegetation of Rock Hill, which is about 100 miles from any other known outcrop of the same kind of rock. On the bare rocks, and on the thin soil which covers them on gentle slopes, I identified the following species (which are here arranged approximately in order of abundance):

	TREES	
<i>Pinus palustris</i>		<i>Quercus geminata</i>
	SHRUBS	
<i>Gaylussacia dumosa</i>		<i>Batodendron arboreum</i>
<i>Vaccinium nitidum</i>		<i>Callicarpa americana</i>
<i>Chrysobalanus oblongifolius</i>		<i>Serenoa serrulata</i>
<i>Symplocos tinctoria</i>		
	HERBS	
<i>Aristida stricta</i>		<i>Pteris aquilina</i>
<i>Chondrophora virgata</i>		<i>Aster</i> sp.§
<i>Chrotonopsis spinosa?</i>		<i>Laciniaria gracilis</i>
<i>Panicum dichotomum?</i>		<i>Campulosus aromaticus</i>

\*See Tenth Census U. S. 6: 224. 1884.

†See Bull. Torrey Club 32: 134-144. 1905; Ann. N. Y. Acad. Sci. 17: 22-23. 1906.

‡See Bull. Torrey Club 32: 149 (second paragraph). 1905; Ann. N. Y. Acad. Sci. 17: 55, 78, 89. 1906; Torrey 7: 43, 44. 1907.

§One of the dichotomous panicums, at any rate. In July, 1906, I saw what is probably the same thing on an outcrop of the same kind of rock in Washington County, Georgia.

|| With rather large blue heads and narrow leaves.

Fimbristylis puberula  
 Fimbristylis laxa  
 Gerardia filifolia?  
 Afzelia cassioides  
 Muhlenbergia expansa

Anthraenantia villosa  
 Trilisa odoratissima  
 Chaptalia tomentosa  
 Agave (Manfreda) virginica

LICHENS  
 Cladonia sp.

Nearly all of these plants are common in ordinary dry pine-barrens in the neighborhood, the only ones especially characteristic of the rocks being the *Chondrophora*, *Crotonopsis*, *Fimbristylis laxa*, and perhaps the *Panicum* and *Agave*.

Next to the wire-grass, our *Chondrophora* seemed to be the most abundant plant. It was in bloom at the time, and I secured plenty of specimens, which agree with those from Georgia and Alabama in every particular.

In some places on the slopes of Rock Hill a little water seeps out, making a suitable habitat for a moist pine-barren flora, of the kind that is characteristic of Southeast Georgia, West Florida, etc. One of the commonest plants in such habitats, from North Carolina to Mississippi, is *Chondrophora nudata*. Here at Rock Hill, as well as in Crisp County, Georgia,\* it could sometimes be found within a few feet of its rock-loving relative; and there being no marked difference between them except in the width and number of their basal leaves, they could hardly be distinguished a few feet away.

This suggests an interesting problem in evolution. If *Chondrophora virgata* were known only from the two localities last mentioned, one might reasonably assume that it was merely a narrow-leaved extreme of the common *C. nudata*, developed in direct response to its rocky habitat. But the fact that it is most abundant in the mountains of Alabama, far removed from any *C. nudata* (which is strictly confined to the coastal plain, and does not even approach the fall-line very closely, as far as known), would seem to make this hypothesis untenable. For all we know, our plant may have been growing on the Carboniferous sandstones long before the coastal plain—or the pine-barren

\*See Bull. Torrey Club 32: 168. 1905. What is now Crisp County was then included in Dooly.

portions of it at least—emerged from the sea. An alternative hypothesis would be that *C. nudata* was evolved from *C. virgata* at a comparatively recent period, geologically speaking, and being in some manner adapted to a widespread habitat became widely



FIG. 1. Ledge of Altamaha Grit on west side of Rock Hill, Florida. *Chondrophora virgata* is common on top of these rocks.

distributed. This however does not account for the remarkably disjointed distribution of *C. virgata*, unless we ascribe to it extraordinary facilities for dissemination. Evidently there are some unknown historical factors still to be taken into consideration.

The known distribution of *Chondrophora virgata* may now be summed up by saying that it is known from three counties in the mountains of Alabama, four in the coastal plain of Georgia, and one in West Florida, always on non-calcareous rocks. (I have seen it myself in all these eight counties, and have collected it in half of them.) The re-discovery of the long-lost stations in Louisiana and Texas is greatly to be desired, especially in view of the fastidiousness of this plant as to habitat. It would appear

from statements in geological literature that a rock similar to the Altamaha Grit occurs in several places in Louisiana (possibly also in Texas), and it is in just such places that the plant should be sought.

Its eastern limit may be placed at the Ochoopee River in Georgia, at least until the mystery of the type-locality is solved. Now it happens that Nuttall was in all probability the first botanist who ever saw an outcrop of Altamaha Grit;\* and knowing this, one might jump to the conclusion that he really found the plant in Georgia, and ascribed it to New Jersey through a mixture of labels or an error of his printers. But unfortunately for this theory, the supposed date of his exploration of the Altamaha Grit country is several years subsequent to the publication of his "Genera"; although it would appear from statements in this book (1: 231, for instance) that he had already visited Augusta and Savannah.

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## NEWS ITEMS

The old house in which Asa Gray lived for forty years, in the botanic garden of Harvard University, is to be taken down to avoid the danger from fire to the adjacent Gray Herbarium. This building, for many years the home of the university herbarium and of Dr. Gray's collections, is to be rebuilt elsewhere without much change in its form.

Dr. and Mrs. N. L. Britton have returned from a collecting trip to Cuba where explorations have been carried on in connection with the studies on the West Indian flora. Most of the collections were made in the western end of the island.

Mr. Lowell M. Palmer has given the Brooklyn Botanic Garden a collection of evergreens consisting of over five hundred plants. Many of these are rare forms in cultivation and their acquirement through the generosity of Mr. Palmer, will materially increase the beauty and educational value of the new garden's collections.

\*See *Torrey* 4: 138-141. 1904.